

GROUP 12

**ENGINE
LUBRICATION**

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GENERAL INFORMATION

M1121000101297

The lubrication method is a fully force-fed, full-flow filtration type.

Item	Specification
Oil pump type	Gear type
Drive method	Crankshaft

ENGINE OILS

⚠ WARNING

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to adapt working practices which prevent, as far as practicable, the risk of skin contact with mineral oils, for example by using enclosed systems for handling used engine oil and by degreasing components, where practicable, before handling them. Other precautions:

Other precautions:

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Avoid contaminating clothes, particularly under-pants, with oil.
- Do not put oily rags in pockets, the use of overalls without pockets will avoid this.
- Do not wear heavily soiled clothing and oil-impregnated foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.

- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.
- Obtain first aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed, especially before meals (skin cleansers and nail brushes will help). After cleaning, the application of preparations containing lanolin to replace the natural skin oils is advised.
- Do not use petrol, kerosine, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin after work.
- If skin disorders develop, obtain medical advice without delay.

SERVICE SPECIFICATIONS

M1121000300889

ITEM	STANDARD VALUE
Engine oil pressure kPa (psi)	at idle 29 (4.2) or more
	at 3,500 r/min 294 –686 (42.7 –99.4)

SEALANT

M1121000501079

Item	Specified sealant
Engine oil pressure switch	Three bond 1215 or Three bond 1212D or equivalent

LUBRICANTS

M1121000402150

Item	Engine oil	Quantity dm ³ (qt)	
Engine oil filter	Engine oils displaying ILSAC certification symbol ("Starburst" symbol) or conforming to the API classification SM or higher	0.3 (0.3)	
Total quantity		2.0L ENGINE	5.1 (5.4)
		2.4L ENGINE	4.6 (4.8)

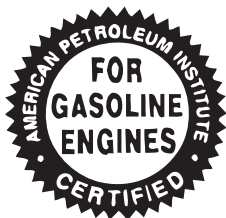
ENGINE OIL

⚠ CAUTION

Never use nondetergent or straight mineral oil.

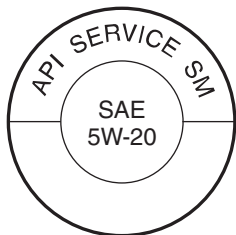
Use only engine oils displaying the ILSAC certification symbol ("Starburst" symbol) on the container.

ILSAC certification symbol
("Starburst" symbol)



AC609011AC

API service symbol

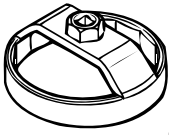
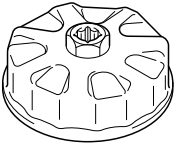
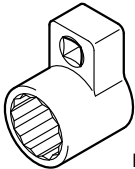
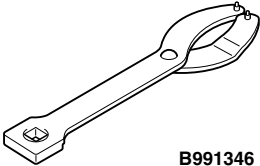


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If these oils are not available, an API classification SM or higher can be used.

SPECIAL TOOLS

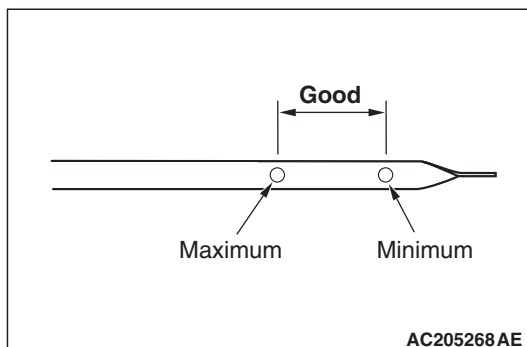
M1121000601968

Tool	Tool number and name	Supersession	Application
 MB991610	MB991610 Oil filter wrench	General service tool	Removal and installation of engine oil filter (When using engine oil filter MD356000.) <2.0L ENGINE>
 B991396	MB991396 Oil filter wrench	General service tool or MB991396-01	Removal and installation of engine oil filter (When using engine oil filter MD360935.) <2.4L ENGINE>
 MB992118	MB992118 Oil pressure switch wrench	—	Removal and installation of engine oil pressure switch
 B991346	MB991346 Top cover wrench	—	Holding the engine oil pump sprocket <2.0L ENGINE>

ON-VEHICLE SERVICE

ENGINE OIL CHECK

M1121000901248



1. Pull out the engine oil dipstick, clean off the engine oil on the engine oil dipstick, and then reinsert the engine oil dipstick.
2. Pull out the engine oil dipstick, and check the engine oil level is within the marks on one side of the engine oil dipstick (engine cover side.)

NOTE:

- Checking the engine oil might be difficult shortly after stopping the engine or engine oil replacement.
 - If difficult, take some time (approx. 30 sec.) and try again.
 - Refer to the information label indicating the engine oil check process on the rocker cover.
3. Check that the engine oil is not excessively dirty, that there is no coolant or gasoline mixed in, and that it is sufficiently thick and slippery.

ENGINE OIL REPLACEMENT <2.0L ENGINE>

M1121001002854

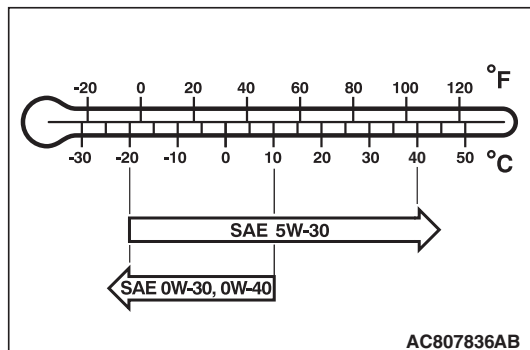
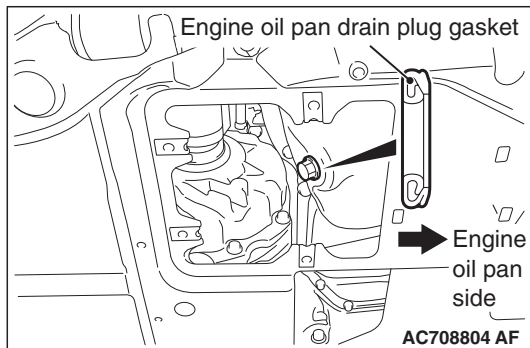
1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 –90° C (176 – 194° F.)

⚠ WARNING

Use care as engine oil could be hot.

2. Remove the engine oil filler cap.
3. Remove the engine room under cover extension (Refer to GROUP 51, Under Cover P.51-20.)
4. Remove the engine oil pan drain plug to drain engine oil.
5. Install a new engine oil pan drain plug gasket so that it faces in the direction shown in the illustration, and then tighten the engine oil pan drain plug to the specified torque.

Tightening torque: 39 ± 5 N· m (29 ± 3 ft-lb)



⚠ CAUTION

For vehicles with turbocharger, engine oil must be properly maintained to avoid engine and/or turbocharger damage. To better protect your engine and turbocharger, use fully synthetic engine oil.

6. Refill with specified quantity of engine oil.

Specified Engine Oil: Engine oils displaying ILSAC certification symbol ("Starburst" symbol) or conforming to the API classification SM or higher

Total quantity: 5.1 dm³ (5.4 quarts)

NOTE: SAE 0W-30 and 0W-40 engine oil are recommended to use to improve engine startability on a very cold weather condition.

7. Install the engine oil filler cap.
8. Let the engine run for a few minutes.
9. Stop the engine, and then check the engine oil level using the engine oil level gauge after a few minutes.
10. Install the engine room under cover extension (Refer to GROUP 51, Under Cover P.51-20.)

ENGINE OIL REPLACEMENT <2.4L ENGINE>

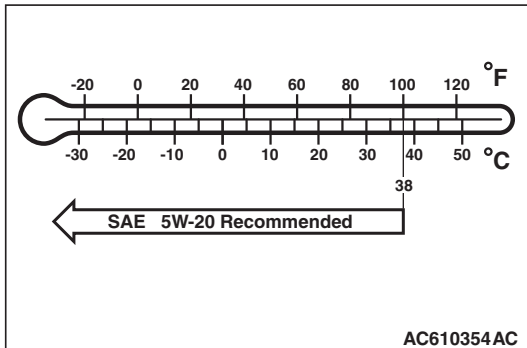
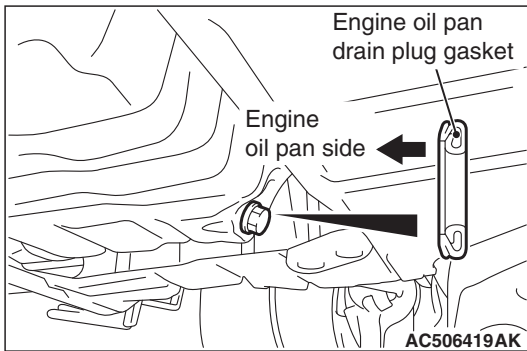
M1121001002616

1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 –90° C (176 – 194° F.)

⚠ WARNING

Use care as engine oil could be hot.

2. Remove the engine oil filler cap.
3. Remove the engine oil pan drain plug to drain engine oil.



4. Install a new engine oil pan drain plug gasket so that it faces in the direction shown in the illustration, and then tighten the engine oil pan drain plug to the specified torque.

Tightening torque: 39 ± 5 N·m (29 ± 3 ft-lb)

5. Refill the specified quantity of engine oil.

Specified Engine Oil: Engine oils displaying ILSAC certification symbol ("Starburst" symbol) or conforming to the API classification SM or higher

Total quantity: 4.6 dm³ (4.8 quarts)

NOTE: SAE 5W-20 engine oil is strongly recommended for optimum fuel economy and cold starting. SAE 10W-30 may be used when the normal operating temperature is above 38°C (100°F.)

6. Install the engine oil filler cap.
7. Let the engine run for a few minutes.
8. Stop the engine, and then check the engine oil level using the engine oil dipstick after a few minutes.

ENGINE OIL FILTER REPLACEMENT <2.0L ENGINE>

M1121001102000

Required Special Tool:

- MB991610: Oil Filter Wrench

1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 – 90°C (176 – 194°F.)

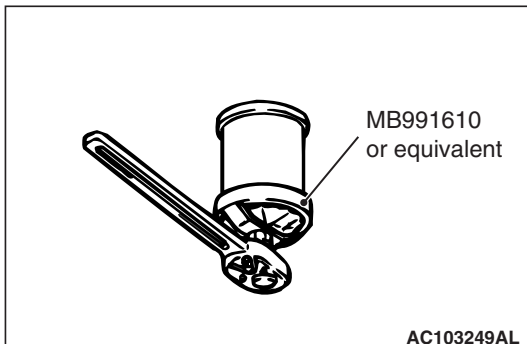
⚠ WARNING

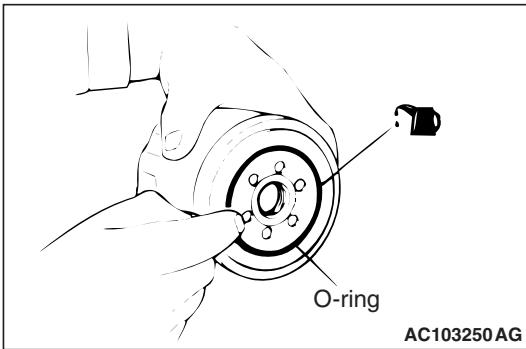
Use care as engine oil could be hot.

2. Remove the engine oil filler cap.
3. Remove the engine room under cover extension (Refer to GROUP 51, Under Cover P.51-20.)
4. Remove the engine oil pan drain plug to drain engine oil.
5. Use the respective tool in the following table to remove the engine oil filter.

Number	Special tool
MD356000	MB991610 or equivalent

6. Clean the filter bracket side mounting surface and ensure the old O-ring has been removed.





7. Apply a small amount of engine oil to the O-ring of the new engine oil filter.
8. Screw on the engine oil filter by hand until it touches the surface of the flange and then tighten it with an oil filter wrench.

Number	Special tool	Tightening torque
MD356000	MB991610 or equivalent	Approximately 3/4 turn [14 ± 2 N· m (124 ± 17 in-lb)]

9. Install the engine oil pan drain plug and refill the engine oil (Refer to P.12-5.)
10. Rev the engine a few times, and check to be sure that no engine oil leaks from the installation section of the engine oil filter.
11. Install the engine room under cover extension (Refer to GROUP 51, Under Cover P.51-20.)

ENGINE OIL FILTER REPLACEMENT <2.4L ENGINE>

M1121001101999

Required Special Tool:

- MB991396: Oil Filter Wrench

1. Start the engine and allow it to warm up until the temperature of the engine coolant reaches 80 –90° C (176 – 194° F.)

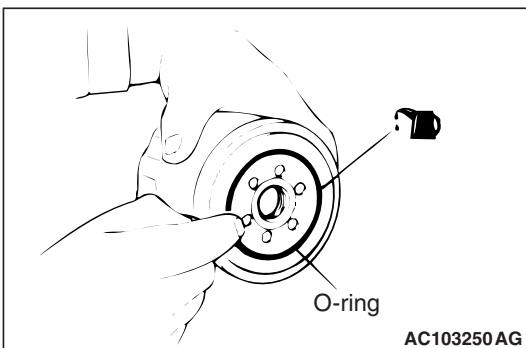
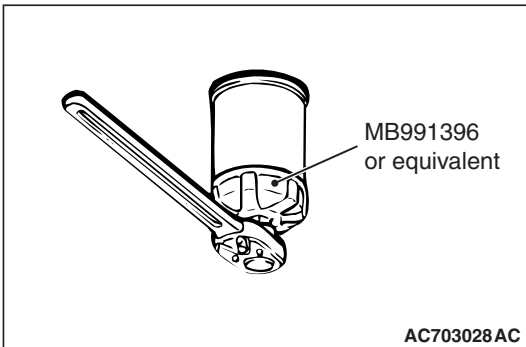
⚠ WARNING

Use care as engine oil could be hot.

2. Remove the engine oil filler cap.
3. Remove the engine oil pan drain plug to drain engine oil.
4. Use the respective tool in the following table to remove the engine oil filter.

Number	Special tool
MD360935	MB991396 or equivalent

5. Clean the filter bracket side mounting surface and ensure the old O-ring has been removed.



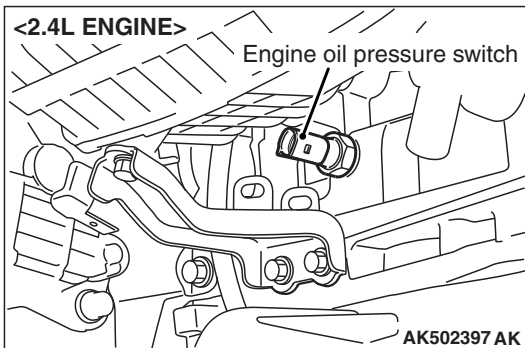
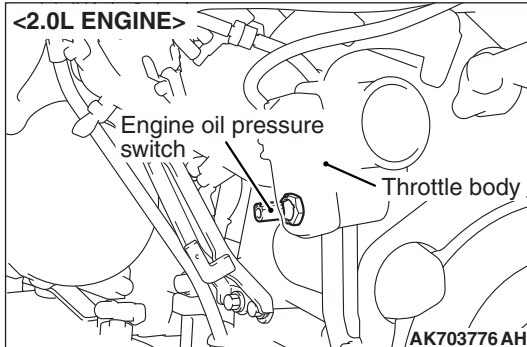
6. Apply a small amount of engine oil to the O-ring of the new engine oil filter.
7. Screw on the engine oil filter by hand until it touches the surface of the flange and then tighten it with an oil filter wrench.

Number	Special tool	Tightening torque
MD360935	MB991396 or equivalent	Approximately 1 turn [14 ± 2 N· m (124 ± 17 in-lb)]

8. Install the engine oil pan drain plug and refill the engine oil (Refer to [P.12-5](#).)
9. Rev the engine a few times, and check to be sure that no engine oil leaks from the installation section of the engine oil filter.

OIL PRESSURE CHECK

M1121002302096



1. Check engine oil level.
2. Remove the engine oil pressure switch (Refer to Removal And Installation [P.12-9](#) <2.0L ENGINE>, [P.12-11](#) <2.4L ENGINE>).
3. Install the engine oil pressure gauge.
NOTE: Use a 1/8 pipe thread adapter.
4. Run the engine to warm it.
5. After the engine has been warmed up, check that engine oil pressure is within the standard value.

Standard value:

At idle: 29 kPa (4.2 psi) or more

At 3,500 r/min: 294 –686 kPa (42.7 –99.4 psi)

6. Remove the engine oil pressure gauge.
7. Install the engine oil pressure switch (Refer to Removal And Installation [P.12-9](#) <2.0L ENGINE>, [P.12-11](#) <2.4L ENGINE>).

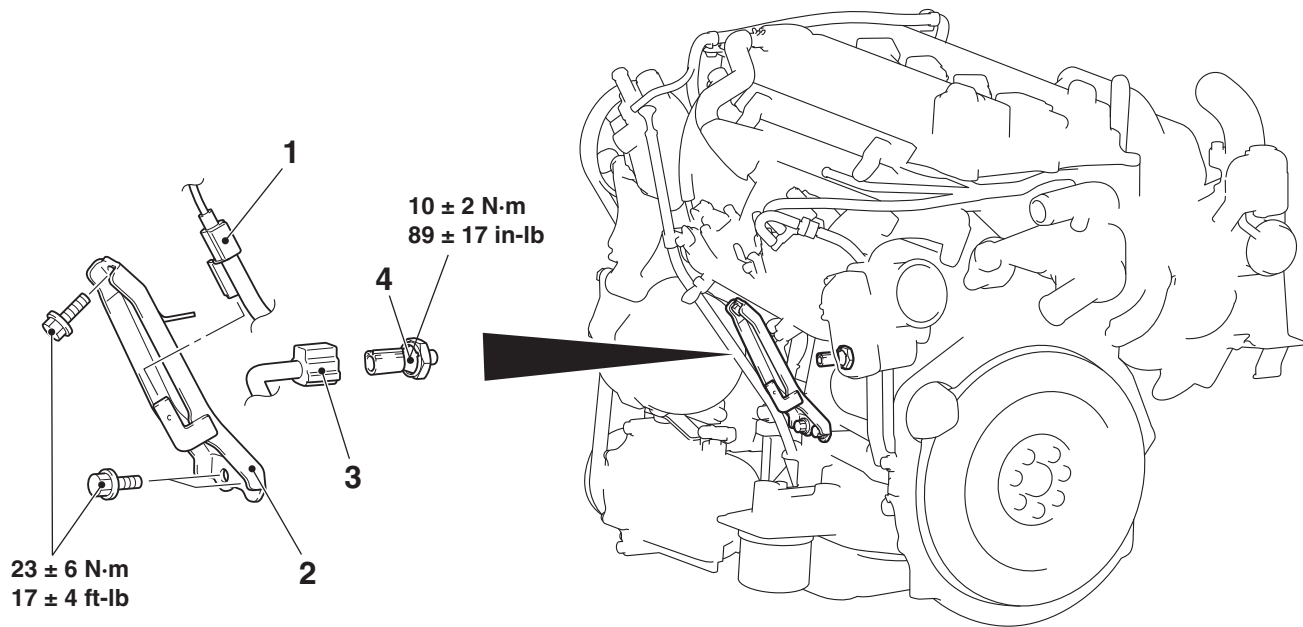
ENGINE OIL PRESSURE SWITCH

REMOVAL AND INSTALLATION <2.0L ENGINE>

M1121002501343

Pre-removal and Post-installation Operation

- Engine Room Under Cover Front A, B Removal and Installation (Refer to GROUP 51, Under Cover [P.51-20.](#))



AC800357AD

Removal steps

1. Engine control wiring harness clamp connection
2. Intake manifold stay (front)

Removal steps (Continued)

3. Engine oil pressure switch connector connection
4. Engine oil pressure switch

Required Special Tool:

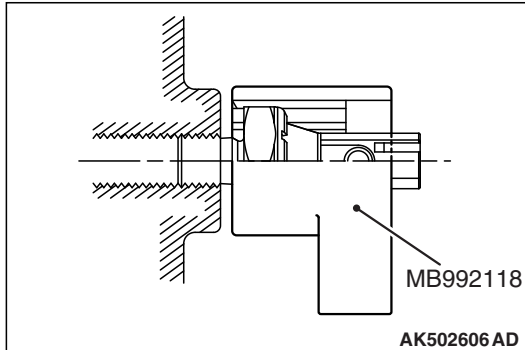
- MB992118: Oil Pressure Switch Wrench

REMOVAL SERVICE POINT

<<A>> ENGINE OIL PRESSURE SWITCH
REMOVAL**⚠ CAUTION**

The sealant is applied to the bolt. Remove the bolt with care not to break it.

Use special tool MB992118 to remove the engine oil pressure switch.



INSTALLATION SERVICE POINT

>>A<< ENGINE OIL PRESSURE SWITCH
INSTALLATION

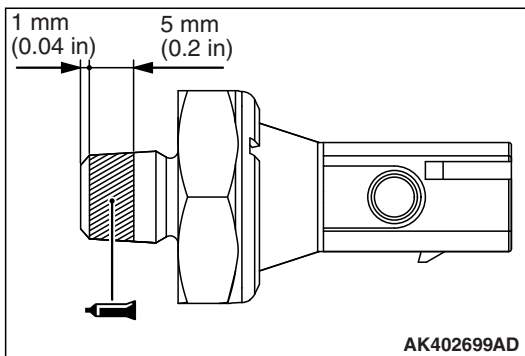
1. Apply sealant to the engine oil pressure switch thread.

Specified sealant: Three bond 1215 or equivalent

NOTE: Install the engine oil pressure switch immediately after applying sealant.

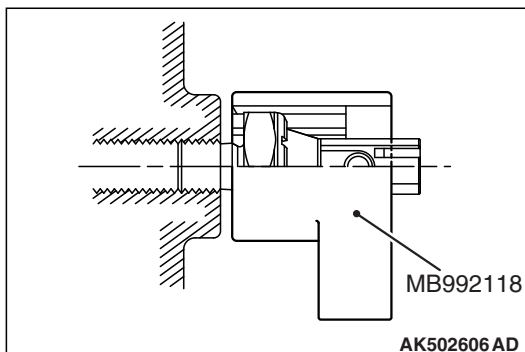
⚠ CAUTION

After the installation, until a sufficient period of time (one hour or more) elapses, do not apply the oil or water to the sealant application area or start the engine.



2. In the same manner as removal, use special tool MB992118 to tighten the engine oil pressure switch to the specified torque.

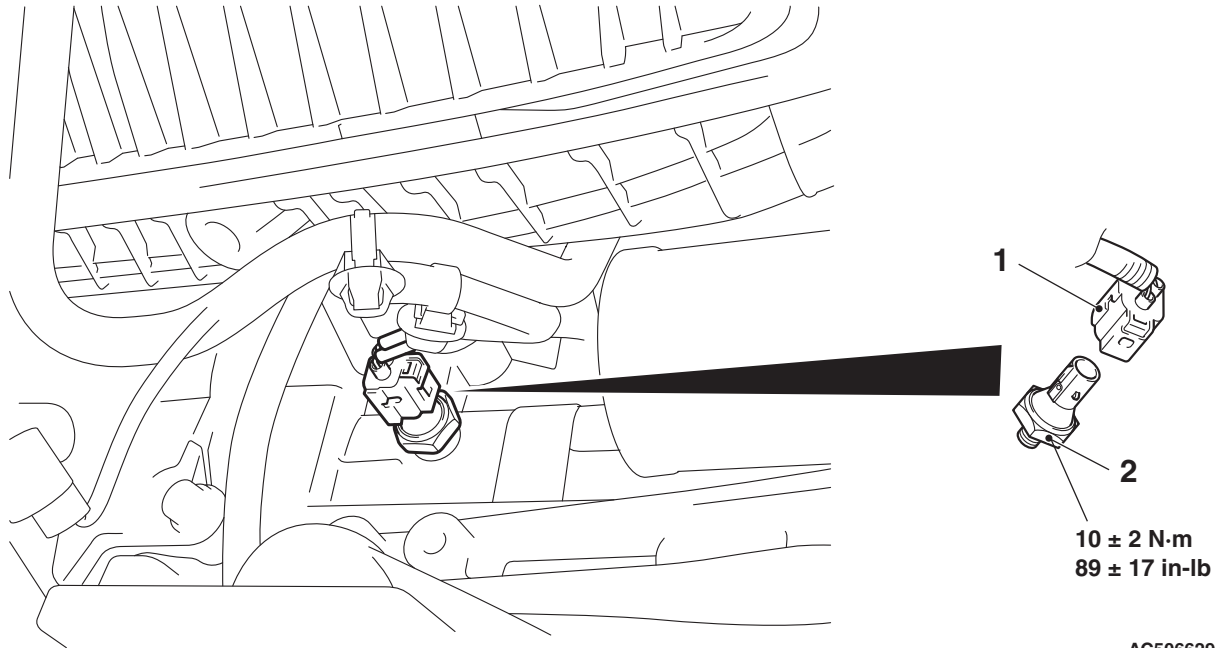
Tightening torque: 10 ± 2 N·m (89 ± 17 in-lb)



REMOVAL AND INSTALLATION <2.4L ENGINE>

M1121002501354

<p>Pre-removal Operation</p> <ul style="list-style-type: none"> • Engine Room Under Cover Front A, B Removal (Refer to GROUP 51, Under Cover P.51-20.) • Intake Manifold Stay Removal (Refer to GROUP 15, Intake Manifold P.15-17.) • Vacuum Hose Removal (Refer to GROUP 35A, Master Cylinder Assembly and Brake Booster P.35A-37.) • Emission Vacuum Hose Removal (Refer to GROUP 15, Intake Manifold P.15-17.) 	<p>Post-installation Operation</p> <ul style="list-style-type: none"> • Emission Vacuum Hose Installation (Refer to GROUP 15, Intake Manifold P.15-17.) • Vacuum Hose Installation (Refer to GROUP 35A, Master Cylinder Assembly and Brake Booster P.35A-37.) • Intake Manifold Stay Installation (Refer to GROUP 15, Intake Manifold P.15-17.) • Engine Room Under Cover Front A, B Installation (Refer to GROUP 51, Under Cover P.51-20.)
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- | | | | |
|--------------------------|--|--|---|
| <p><<A>></p> | <p>Removal steps</p> <ul style="list-style-type: none"> • Throttle body mounting bolts (Refer to GROUP 13B, Throttle Body Assembly P.13B-1020) | <p><> >>A<<</p> | <p>Removal steps (Continued)</p> <ol style="list-style-type: none"> 1. Engine oil pressure switch connector connection 2. Engine oil pressure switch |
|--------------------------|--|--|---|

Required Special Tool:

- MB992118: Oil Pressure Switch Wrench

REMOVAL SERVICE POINTS

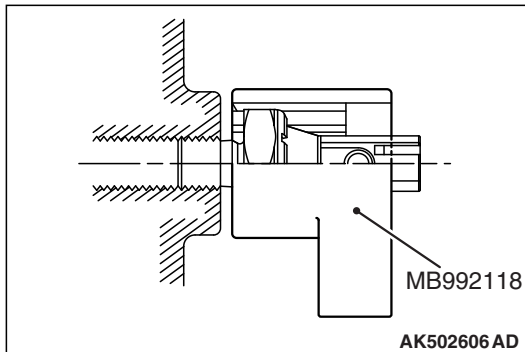
**<<A>> THROTTLE BODY MOUNTING BOLTS
REMOVAL**

Remove the throttle body mounting bolts and put the throttle body aside so as not to interfere the engine oil pressure switch connector disconnection.

<> ENGINE OIL PRESSURE SWITCH
REMOVAL**⚠ CAUTION**

The sealant is applied to the bolt. Remove the bolt with care not to break it.

Use special tool MB992118 to remove the engine oil pressure switch.



INSTALLATION SERVICE POINT

>>A<< ENGINE OIL PRESSURE SWITCH INSTALLATION

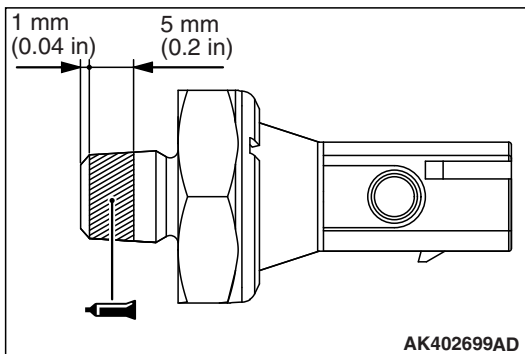
1. Apply sealant to the engine oil pressure switch thread.

Specified sealant: Three bond 1215 or equivalent

NOTE: Install the engine oil pressure switch immediately after applying sealant.

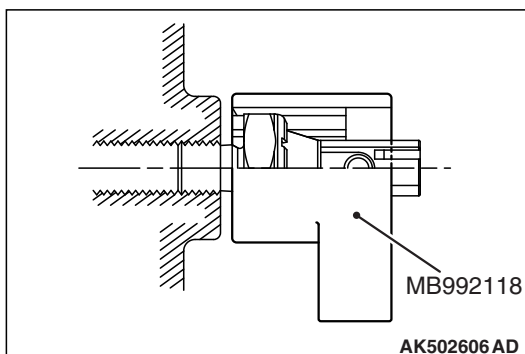
⚠ CAUTION

After the installation, until a sufficient period of time (one hour or more) elapses, do not apply the oil or water to the sealant application area or start the engine.



2. In the same manner as removal, use special tool MB992118 to tighten the engine oil pressure switch to the specified torque.

Tightening torque: 10 ± 2 N·m (89 ± 17 in-lb)



OIL PUMP CHAIN <2.0L ENGINE>

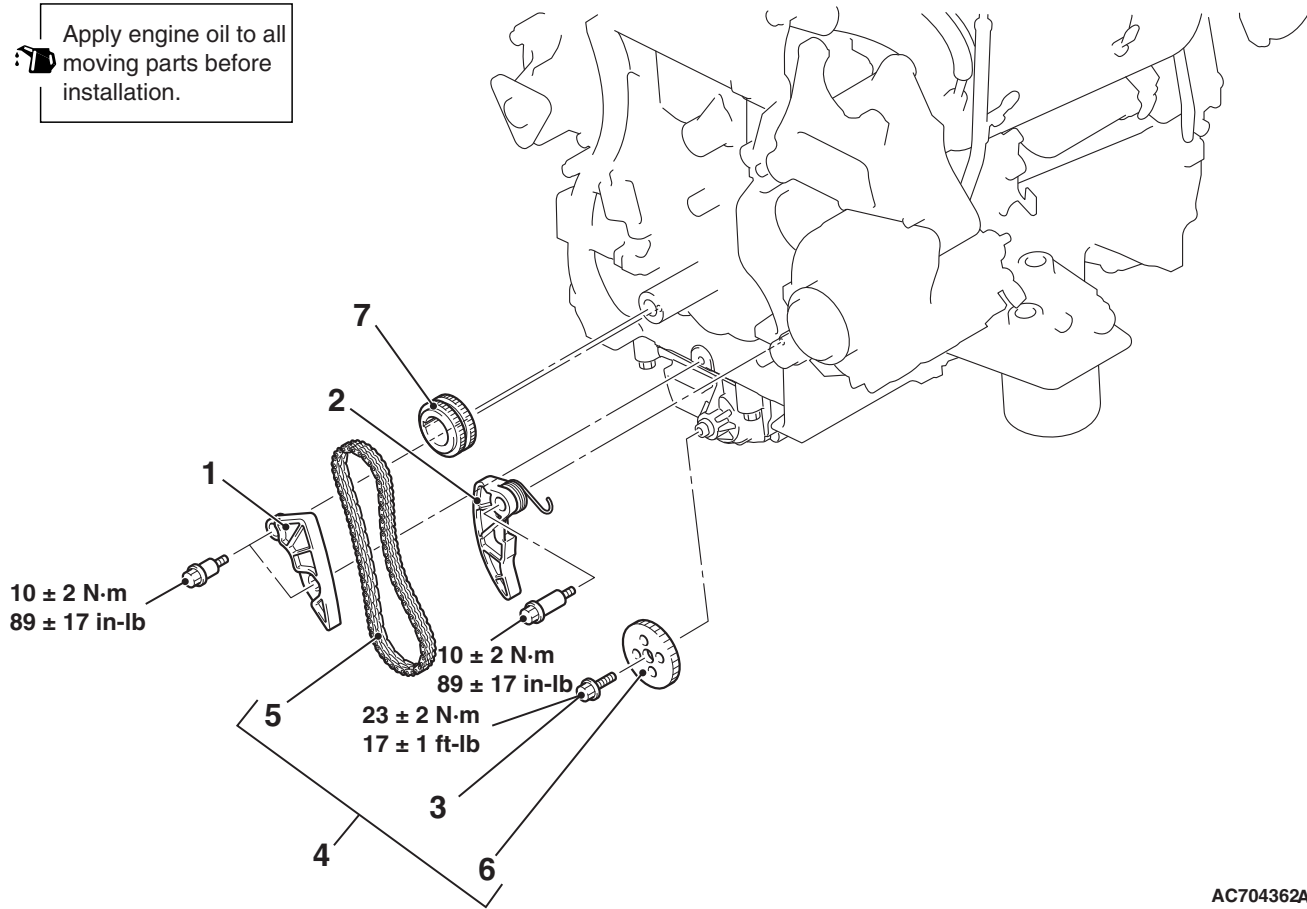
REMOVAL AND INSTALLATION

M1121003100259

Pre-removal and Post-installation Operation

- Timing Chain Removal and Installation (Refer to GROUP 11A, Timing Chain P.11A-68.)

Apply engine oil to all moving parts before installation.



AC704362AD

Removal steps

1. Balancer timing chain guide
 2. Engine oil pump chain tensioner
 3. Engine oil pump sprocket center bolt
- <<A>> >>B<<

<<A>>

Removal steps (Continued)

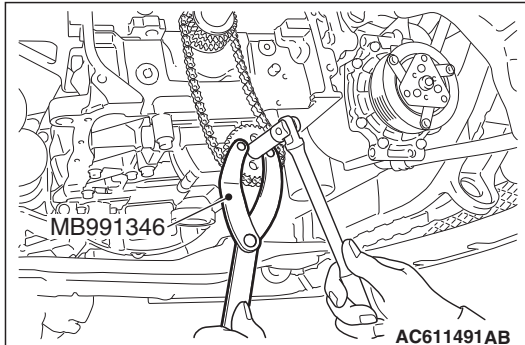
4. Engine oil pump drive chain and engine oil pump sprocket
 5. Engine oil pump drive chain
 6. Engine oil pump sprocket
 7. Crankshaft sprocket
- >>B<< >>B<< >>A<<

Required Special Tool:

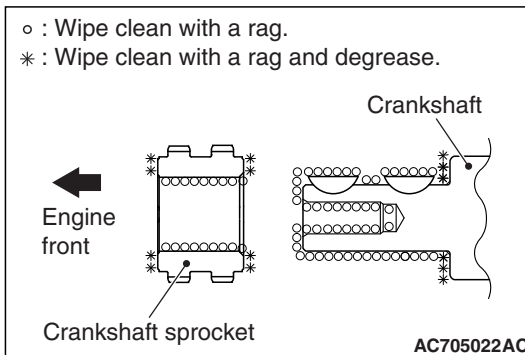
- MB991346: Top Cover Wrench

REMOVAL SERVICE POINT**<<A>> ENGINE OIL PUMP SPROCKET CENTER BOLT/ENGINE OIL PUMP DRIVE CHAIN AND ENGINE OIL PUMP SPROCKET REMOVAL**

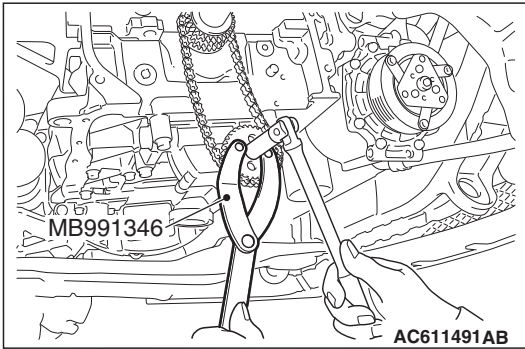
1. Hold the engine oil pump sprocket with special tool MB991346.
2. Loosen the engine oil pump sprocket center bolt and remove the engine oil pump drive chain and engine oil pump sprocket.

**INSTALLATION SERVICE POINTS****>>A<< CRANKSHAFT SPROCKET INSTALLATION**

1. Wipe off the dirt on the crankshaft sprocket and crankshaft as shown in the figure using a rag, and then degrease them.
NOTE: Degrease them to prevent drop in the friction coefficient of the pressed area, which is caused by oil adhesion.
2. Install the crankshaft sprocket to the crankshaft.

**>>B<< ENGINE OIL PUMP SPROCKET/ENGINE OIL PUMP DRIVE CHAIN/ENGINE OIL PUMP SPROCKET CENTER BOLT INSTALLATION**

1. Set the number 1 cylinder to the top dead center of compression.
2. Install the engine oil pump sprocket to the engine oil pump drive chain.
3. Install the engine oil pump drive chain in the crankshaft sprocket while the engine oil pump sprocket is installed in the engine oil pump drive chain.
4. Install the engine oil pump sprocket in the engine oil pump assembly while the engine oil pump sprocket is installed in the engine oil pump drive chain.



5. Hold the engine oil pump sprocket with special tool MB991346 in the same manner as removal.
6. Tighten the engine oil pump sprocket center bolt to the specified torque.

Tightening torque: 23 ± 2 N·m (17 ± 1 ft-lb)

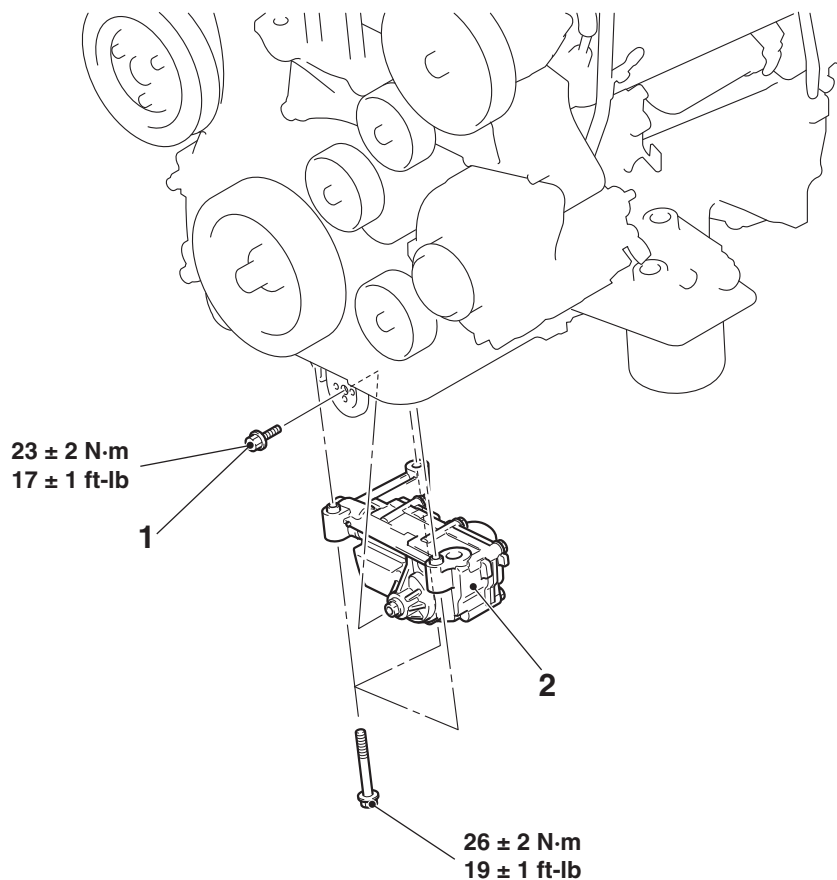
OIL PUMP <2.0L ENGINE>

REMOVAL AND INSTALLATION

M1121001600258

Pre-removal and Post-installation Operation

- Engine Oil Pan Removal and Installation (Refer to GROUP 11A, Oil Pan [P.11A-50.](#))



AC704363AE

Removal steps

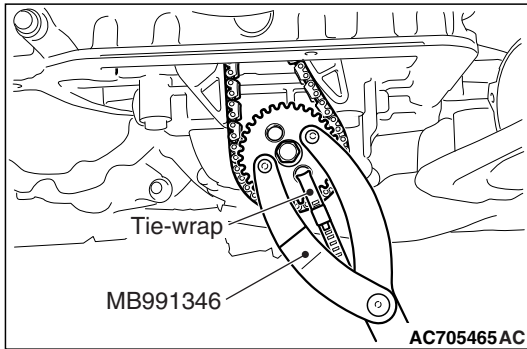
- <<A>> <<A>>
1. Engine oil pump sprocket center bolt
 2. Engine oil pump assembly

Required Special Tool:

- MB991346: Top Cover Wrench

REMOVAL SERVICE POINT

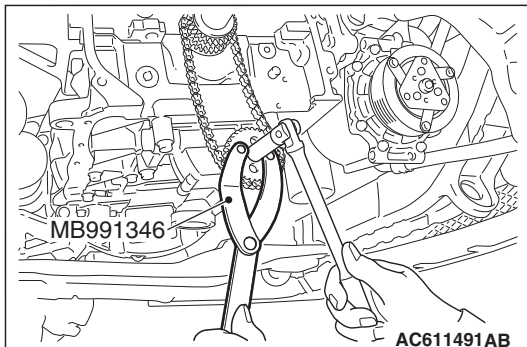
<<A>> ENGINE OIL PUMP SPROCKET CENTER BOLT REMOVAL



1. Tie the engine oil pump sprocket and the engine oil pump drive chain using the tie-wrap to prevent the engine oil pump sprocket from falling down.
2. Hold the engine oil pump sprocket with special tool MB991346.
3. After removing the engine oil pump sprocket center bolt, disconnect the engine oil pump sprocket from the engine oil pump assembly while the engine oil pump sprocket is installed in the engine oil pump drive chain.

INSTALLATION SERVICE POINT

>>A<< ENGINE OIL PUMP SPROCKET CENTER BOLT INSTALLATION



1. Install the engine oil pump sprocket in the engine oil pump assembly while the engine oil pump sprocket is installed in the engine oil pump drive chain.
2. Hold the engine oil pump sprocket with special tool MB991346 in the same manner as removal.
3. Tighten the engine oil pump sprocket center bolt to the specified torque.
Tightening torque: 23 ± 2 N·m (17 ± 1 ft-lb)
4. Remove the tie-wrap securing the engine oil pump sprocket and engine oil pump drive chain to prevent the slippage between them.